MICHIGAN

DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

FOR

**MARINE MATTRESS**

BAY:MP 1 of 3 APPR:DMG:SCK:09-12-23

**a. Description.** This work consists of manufacturing, delivering, and installing polymetric marine mattresses along the bottom of stone revetment as shown on the plans. Complete all work in accordance with the standard specifications, the plans, and this special provision.

**b. Materials.** Furnish BaseLok Marine Mattress system, Tensar Triton Marine Mattress system, or Engineer approved equal marine mattress system.

Ensure the geogrid used for top, bottom, sides, and internal diaphragms of the unit is produced from virgin resin, classified as polypropylene, and possess complete continuity of all properties throughout the structure. The geogrid must meet the physical requirements specified for Type 1 geogrid in Table 1 herein.

**Table 1: Type 1 Geogrid Physical Property Requirements**

|  |  |  |  |
| --- | --- | --- | --- |
| Property | Test Method | Units | Type 1 |
| Aperture Dimensions | - | inches (mm) | 1.0/1.3 (25/34) |
| Rib Thickness (minimum) | - | inches (mm) | 0.07/0.07 (1.78/1.78) |
| True 1% Tensile Modulus in Use  (MD/XMD) | *ASTM D6637/D6637M* | lb/ft (kN/m) | 24,000/28,400 (350/415) |
| Junction Strength (MD/XMD) | *ASTM D7737/D7737M* | lb/ft (kN/m) | 1,665/1,911 (24.3/27.9) |
| Flexural Stiffness | *ASTM D7748/D7748M* | mg-cm | 2,000,000 |
| Resistance to Long Term Degradation | *EPA 9090* | % | 100 |
| Ultraviolet Stability (Retained Strength @ 500 hours) | *ASTM D4355/D4355M* | % | 98 |

Furnish rigid mechanical connection elements such as bodkins, pins, or hooks as specified by the manufacturer.

Ensure the braid used for tying and lacing together the marine mattress units is in accordance with the manufacturer’s requirements.

Ensure heavy geotextile liner is in accordance with section 910 of the Standard Specifications for Construction.

Use durable crushed stone for filling that is of acceptable quality to ensure long term performance in the mattress and the climate at the work site. Furnish stone free from cracks, seams and other defects that would tend to increase the deterioration in the mattress. The inclusion of objectionable quantities of debris, sand, clay, and rock fines will not be permitted. The use of recycled crushed concrete is not permitted. Ensure the stone is hard, angular, durable and resistant to weathering and water action; having approximately 2.5 minimum bulk dry specific gravity and 2.5 percent maximum 24 hour soak absorption in accordance with *ASTM D6473*. The weight loss in 5 cycles by use of sulfate soundness testing must not exceed 10 percent in accordance with *ASTM D5240/D5240M*. Ensure the gradation for fill stone meets the requirements specified in Table 2 herein. *ASTM D4992* provides guidance on evaluating and selecting rock from a source.

**Table 2: Individual Stone Gradation Requirements for Fill Stone**

|  |  |
| --- | --- |
| U.S. Sieve Size (inches) | Percent Smaller Than |
| 5 | 100 |
| 4 | 35 - 70 |
| 3 | 15 - 20 |
| 2 | 5 - 10 |
| 1.5 | 0 |

**c. Construction.** Submit the following items for Engineer approval prior to fabrication:

1. Shop drawings which show details of the typical mattress sections and connections.

2. Geogrid product data sheet and certification from the manufacturer that the geogrid product supplied meets the physical requirements of this special provision. Submit a sample for testing in accordance with the *MQAP Manual* from the geogrid manufacturer for the specific product intended for use prior to fabrication and installation of the marine mattresses.

3. Manufacturer’s general recommendations and instructions for fabrication, filling, installation, and repair.

4. Furnish Test Data Certification in accordance with the *MQAP Manual* from the geotextile manufacturer for the specific product intended for use prior to installation.

Place marine mattresses at the elevation, alignment and orientation shown on the plans or as directed by the Engineer. Clear areas to be covered by marine mattresses of brush, trees, stumps, debris, and surplus or unsuitable soil. Shape and compact all grades to the required cross section. Furnish the necessary shoring to maintain a stable excavation when placing heavy geotextile liner and riprap below water. Place heavy geotextile liner on prepared grades in accordance with the *Soil Erosion and Sedimentation Control Manual*. Ensure the marine mattress installation does not damage the heavy geotextile liner. Ensure heavy geotextile liner is placed in full length strips. Ensure damaged heavy geotextile liner is repaired or removed and replaced as directed by the Engineer at no cost to the contract. Construction equipment or vehicular traffic is not allowed directly on the geotextile or marine mattress.

Once the heavy geotextile liner is placed, place the marine mattresses as shown on the plans. Place the marine mattress units in accordance with the recommendations of the system supplier and as approved by the Engineer. Use a spreader beam and/or spreader bars for lifting so that the unit is not subject to severe bending or distortion and that the top and bottom layers of geogrid are tensioned uniformly across the width of placement. The units should generally be lifted from a horizontal position. Tag lines and/or divers may be required to facilitate proper placement of the units. Where applicable, splice and/or anchor the units as shown on the shop drawings or as directed by the Engineer.

Repair or replace any mattress units damaged during fabrication, filling, or installation as directed by the Engineer. Ensure damaged mattress units are repaired or removed and replaced as directed by the Engineer at no cost to the contract.

**d. Measurement and Payment.** The completed work, as described, will be measured and paid for at the contract unit price using the following pay item:

**Pay Item Pay Unit**

Marine Mattress Square Yard

**Marine Mattress** will be measured in place by the square yard at the specified depth and includes furnishing all labor, equipment, and materials to manufacture, deliver, and install polymetric marine mattresses and heavy geotextile liner as shown on the plans and in accordance with this special provision.